

In the Claims

1 1. (currently amended) A method for temporally processing an input video
2 including a plurality of input frames, each of the input frames having an
3 associated input frame play time, and the input video having a total input
4 video play time that is a sum of the input frame play times of all of the input
5 frames, comprising:
6 classifying each of the plurality of input frames according to a content
7 characteristic of each of the input frames; and
8 allocating an output frame play time to each of the plurality of input
9 frames that is based on the classified content characteristic of each of the
10 input frames to generate a plurality of output frames.

1 2. (original) The method of claim 1 wherein the content characteristic is
2 based on low-level features of each of the input frames.

1 3. (currently amended) The method of ~~claim 1~~ claim 2 wherein the low-level
2 features are selected from a group consisting of motion vectors, color,
3 texture, brightness, contrast, spectral parameters, local and global motion,
4 activity, trajectory, speed, acceleration, object shape, object size, number of
5 objects, number of faces, pitch, volume, tempo, and combinations thereof.

1 4. (original) The method of claim 1 wherein the content characteristic is
2 based on high-level features of each of the input frames.

1 5. (currently amended) The method of ~~claim 1~~ claim 4 wherein the high-level
2 features are selected from a group consisting of genre, dramatic intensity,
3 humor content, action level, beauty, lyricism, musical intensity, educational
4 quality, profundity, nudity, linguistic class, and combinations thereof.

1 6. (original) The method of claim 1 wherein the allocating of the play time is
2 dynamically varied while processing the video.

1 7. (original) The method of claim 1 wherein the allocated output frame play
2 time of each of the output frames is determined by sampling the input frames.

1 8. (original) The method of claim 7 wherein the sampling is a down-sampling
2 of the input frames.

1 9. (original) The method of claim 7 wherein the sampling is an up-sampling
2 of the input frames.

1 10. (original) The method of claim 9 wherein up-sampled output frames are
2 interpolated from the input frames.

1 11. (original) The method of claim 7 wherein the sampling is a combination
2 of down-sampling and up-sampling of the input frames.

1 12. (original) The method of claim 1 wherein the allocated output frame play
2 time of each of the output frames is determined by an output frame rate of the
3 output frame.

1 13. (original) The method of claim 12 wherein the output frame rate is
2 increased for selected input frames.

1 14. (original) The method of claim 12 wherein the output frame rate is
2 decreased for selected input frames.

1 15. (original) The method of claim 1 further comprising:
2 measuring the content characteristics of each of the plurality of input
3 frames to determine the classification.

1 16. (original) The method of claim 15 further comprising:
2 computing a statistical moment for the measured content
3 characteristics to determine the classification.

1 17. (currently amended) The method of claim 1 wherein the allocation of
2 play time is based on a constant level of motion activity in the ~~output video~~
3 plurality of output frames.

1 18. (currently amended) The method of claim 1 wherein the allocation of
2 play time is based on a guaranteed minimum level of activity in the ~~output~~
3 ~~video~~ plurality of output frames.

1 19. (original) The method of claim 1 further comprising:
2 partitioning the input video into a plurality of segments, and
3 processing the input video on a per segment basis.

1 20. (currently amended) The method of claim 1 wherein still frames are
2 selected for the ~~output video~~ plurality of output frames when the allocated
3 output frame play time exceeds a temporal Nyquist limit.

1 21. (currently amended) The method of claim 1 further comprising:
2 allocating a total output video play time for an output video; and
3 allocating the output frame play times so that a sum of the output
4 frame play times of the plurality of output frames is equal to the total output
5 video play time of the output video.

1 22. (currently amended) The method of ~~claim 1~~ claim 21 wherein the
2 allocated play time of a particular frame can range on a continuum from zero
3 time to a length of time of the output video.

1 23. (currently amended) The method of ~~claim 1~~ claim 21 wherein the
2 allocation of play time is based on a motion activity in the output video, and a
3 measure of motion activity is an average of magnitudes of motion vectors of
4 the frames.

1 24. (original) The method of claim 23 where the average motion vector
2 magnitude \hat{r} of the input video of N frames is expressed as:

3
$$\hat{r} = \left(\frac{1}{N}\right) \sum_{i=1}^N r_i,$$

4 where an average motion vector magnitude of frame i is r_i .

1 25. (original) The method of claim 24 wherein a relationship between a
 2 length L_{output} of the output video and a length L_{input} of the input video is
 3 expressed as

$$4 \quad L_{\text{output}} = \frac{\hat{r}}{r_{\text{target}}} L_{\text{input}}$$

5 for a target level of motion activity r_{target} in the output video.

1 26. (original) The method of claim 25 further comprising:

2 classifying all of frames j of the input video having the motion activity
 3 equal to or higher than a targeted level of minimum motion activity into a
 4 first set S_{higher} having a length L_{higher} ;

5 classifying all of frames k of the input video having the motion activity
 6 lower than the targeted level of minimum motion activity into a second S_{lower}
 7 having a length L_{lower} ;

8 summing $L_{\text{higher}} + L_{\text{lower}}$ to determine a L_{input} of the input video to
 9 determine a length of the output video by

$$10 \quad L_{\text{output}} = \left(\frac{\hat{r}_{\text{lower}}}{r_{\text{target}}} \right) L_{\text{lower}} + L_{\text{higher}}.$$

1 27. (currently amended) A system for temporally processing an input video
 2 including a plurality of input frames, each of the input frames having an
 3 associated input frame play time, and the input video having a total input
 4 video play time that is a sum of the input frame play times of all of the input
 5 frames, comprising:

6 means for classifying each of the plurality of input frames according to
 7 a content characteristic of each of the input frames;

8 means for allocating a total output video play time for an output video;
9 and
10 means for allocating an output frame play time to each of the plurality
11 of input frames that is based on the ~~classified~~ content characteristic of each of
12 the input frames to generate a plurality of output frames so that a sum of the
13 output frame play times of the plurality of output frames is equal to the total
14 output video play time of the output video.

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